

### **Remarks**

Claims 1 and 3-44 are pending upon entry of the foregoing amendments.

#### **Amendments to the Claims**

Claim 1 has been amended to specify that the method further comprises infiltrating the shrunk inverse replica with a second fluid material which can be immobilized and then immobilizing the infiltrated second fluid material. Specifically, the shrunk inverse replica comprises at least a fourth phase and a fifth phase which is immiscible with the fourth phase, and the infiltration displaces the fifth phase of the shrunk inverse replica to form a third multicontinuous or bicontinuous structure which comprises the fourth phase and a sixth phase which consists of the second fluid material which is immiscible with the fourth phase. The infiltrated second fluid material is immobilized in the third multicontinuous or bicontinuous structure. Support for this amendment can be found, for example, at page 2 line 28 through page 3 line 7, and in original claim 2. Claim 2 has accordingly been canceled, and claims 3, 13, and 15 have been amended to comport with the amendment to claim 1.

In addition, claims 3, 4, 23, 24, and 25 have been amended to render the antecedent of claim terms more clear. In particular, the amendments better distinguish among the different phases recited in the steps of the claimed process. Support for the amendment is found throughout the specification, including pages 8-10.

#### **Rejection under 35 U.S.C. §103**

Claims 1-5, 7-8, 11-12, 15-25, 27-28, 31-32, and 35-44 are rejected under 35 U.S.C. § 103(a) as obvious over U.S. Patent No. 6,261,469 to Zakhidov et al. (hereinafter "Zakhidov"). Claims 6 and 26 are rejected under 35 U.S.C. § 103(a) as obvious over Zakhidov in view of U.S.

Patent Application Publication No. 2003/0006534 to Taboas et al. (hereinafter "Taboas").

Claims 9-10, 13-14, 29-30, and 33-34 are rejected under 35 U.S.C. § 103(a) as obvious over Zakhidov in view of Taboas and further in view of U.S. Patent No. 5,980,813 to Narang et al. (hereinafter "Narang"). The rejections are respectfully traversed if applied to the claims as amended.

Claims for an invention are not *prima facie* obvious if the primary references do not suggest all elements of the claimed invention and the prior art does not suggest the modifications that would bring the primary references into conformity with the application claims. In re Fritch, 23 U.S.P.Q.2d 1780 (Fed. Cir. 1992); In re Laskowski, 871 F.2d 115 (Fed. Cir. 1989). No *prima facie* case of obviousness has been established by the Office Action for the claims as amended.

Zakhidov teaches a method of producing a three dimensional periodic structure for use in electronics by infiltrating a first structure of material A with a material B, and then removing the material A to form an *exact* inverse replica of the original structure. Zakhidov also teaches infiltrating the inverse replica with a material C and then removing material B to create a *direct* replica of material C. Zakhidov does not teach a method to produce a *shrunk* direct replica. That is, Zakhidov teaches away from any further processing of a *shrunk* replica or a *shrunk* inverse replica to make *further* replicas, as is now required by Applicants' claims. Accordingly, each and every element of the claims as amended is not disclosed in Zakhidov.

Furthermore, absent improper hindsight reconstruction based on Applicants' disclosure, one of ordinary skill in the art would not have been motivated to adapt or modify the teachings of Zakhidov to produce a *shrunk* replica. Zakhidov teaches that the creation of a specific type of inverse replica, namely a glassy carbon inverse replica, requires the pyrolysis of an organic resin,

which incidentally results in a 20% or higher contraction in the dimensions of the inverse replica.

However, Zakhidov specifically teaches that methods resulting in shrinkage are unsatisfactory and produce an imperfect structure:

Velev et al. [Nature 389, 447 (1997)] made three-dimensionally periodic shells of silica by using a chemical reaction to form the silica as a coating within polystyrene latex particle arrays, and then burning away the polystyrene (causing 20-35% shrinkage of the unit-cell parameter). Likewise, Wijnhoven and Vos (Science 281, 802 (1998) made analogous crystals consisting of titania by assembling polystyrene latex spheres into a face centered-cubic structure, chemically reacting tetrapropoxytitane inside the polystyrene sphere structure... and then burning away the polystyrene spheres (providing 33% shrinkage of the unit-cell parameter).... However, this approach is **generally unsatisfactory** because of...(4) the occurrence of about 20-35% shrinkage of lattice parameter of the final structure relative to the initial structure, which can **disrupt** structural perfection.

(Column 2, lines 19-45).

As Zakhidov specifically states that shrunken replicas, as opposed to exact replicas, are unsatisfactory and imperfect, one having ordinary skill in the art would have been completely unmotivated to use the *shrunken* inverse replica of Zakhidov to produce a **further shrunken** direct replica. In contrast, one of Applicants' embodiments desirably includes cyclical shrinking. See Page 14, Lines 11-29, of Applicants' Specification.

Furthermore, neither Taboas nor Narang provides the necessary teaching sufficient for one skilled in the art to combine with Zakhidov and then to modify the combined teachings to somehow derive the presently claimed methods. Taboas teaches the fabrication of a porous mold that is used to cast scaffolds that are used as tissue regeneration platforms. It fails, however, to remotely suggest methods for making any type of *shrunken* inverse replica or *shrunken* replica.

One of ordinary skill in the art would have had no reason to combine Taboas and Zakhidov, as the references mention structures for addressing unrelated problems in non-analogous arts.

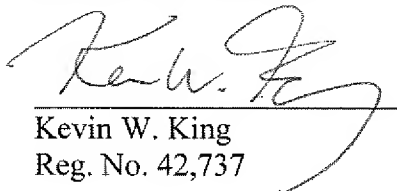
Narang teaches the layer by layer fabrication of a three-dimensional object using a material that contains a metal covalently bonded to a nonmetal. It fails, however, to remotely suggest methods for making any type of *shrunk* inverse replica or *shrunk* replica. One of ordinary skill in the art would have had no reason to combine Taboas and Zakhidov, as the references mention structures for addressing unrelated problems in non-analogous arts.

### **Conclusions**

For the foregoing reasons, Applicants submit that the claims are non-obvious over the prior art of record. Allowance of claims 1 and 3-44 is therefore respectfully submitted.

The undersigned kindly invites the Examiner to contact him by telephone (404.853.8068) if any outstanding issues can be resolved by conference or examiner's amendment.

Respectfully submitted,

  
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